



Polyamide 66, Glass Fiber Reinforced, Improved Impact, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of glass fiber reinforced, improved impact properties, heat stabilized polyamide 66 resin for injection molding. These materials require high strain rate tensile strength data.

1.2 Symbols. The material abbreviations according to ISO 11469 are shown in Table 1.

1.3 Applicability. Typical applications include, but are not limited to, the following: engine mounts and brackets.

1.4 Remarks. The classification into groups is according to the different ranges of glass fiber content. Additional glass fiber reinforcement ranges may be added as necessary.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM D6869	ISO 188	ISO 1183	ISO 3451
ISO 75	ISO 294	ISO 1874-1	ISO 11469
ISO 179/1eA	ISO 527-1/2	ISO 1874-2	ISO 15512

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14335
GMW3059	GMW14270	

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.1.1 Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294, with the conditions for injection molding from ISO 1874-1.

3.1.2 All values indicated herein are based on material considered to be in the dry-as-molded state, with moisture content of 0.2% maximum (ASTM D6869, ISO 15512 Method A or B, or GMW14335). Immediately after molding, specimens shall be sealed in moisture-proof containers and stored at $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for at least 24 h prior to test, as specified in ISO 1874-2. All tests shall be performed on unannealed specimens immediately after their removal from the containers into a controlled atmosphere, per GMW3221, Code A (unless otherwise specified.) In addition, tests specified at temperatures below or above $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

3.1.3 The minimum values specified in Table 1 must be met by test specimens in natural or black color. A standard sample color can be used if natural or black are unavailable.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in charts. The color shall be specified on drawings, in material specifications and otherwise.

3.3 Compound Properties (Natural and Black). See Table 1. The following are also required for full standard approval. The minimum number of lots per test required is one (1) in natural: Poisson's Ratio, electronic Stress/Strain Curve at multiple temperatures (for example $-30\text{ }^{\circ}\text{C}$, $+23\text{ }^{\circ}\text{C}$, $+125\text{ }^{\circ}\text{C}$, $+140\text{ }^{\circ}\text{C}$), Coefficient of Linear Thermal Expansion (CLTE), Mold Shrinkage. See GMW3013 for all test procedures and parameters.

3.4 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications.

3.5 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

Table 1: Compound Properties (Natural and Black)

Nominal Glass Fiber Percentage			
			50%
Property	Standard	Units	Value
ISO Symbol	ISO 11469		>PA66-I-GF50<
Ash	ISO 3451	%	47 to 53
Density	ISO 1183	g/cm ³	Target Range 1.52 to 1.60
Moisture Content	ISO 15512, Method A or B or GMW14335	%	≤ 0.2
Tensile Modulus	ISO 527-1/2	MPa	14 000 to 18 500
Tensile Stress at Break	ISO 527-1/2	MPa	≥ 180
Tensile Strength at Break			
Tensile Stress at Break after Heat Aging ^{Note 1}	ISO 188 ISO 527	% Retention	≥ 75
Tensile Strain at Break	ISO 527-1/2	%	≥ 2.0
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m ²	≥ 12.0 ≥ 10.0
Notched Charpy Impact after Heat Aging ^{Note 1}	ISO 188 ISO 179/1eA	% Retention	≥ 75
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥ 240
High Strain Rate Tensile Strength Parallel to Flow ^{Note 2}			
1 m/s	ISO 527-1/2	MPa	≥ 270
0.1 m/s	ISO 527-1/2	MPa	≥ 260
0.01 m/s	ISO 527-1/2	MPa	≥ 240
0.001 m/s	ISO 527-1/2	MPa	≥ 225
High Strain Rate Tensile Strength Perpendicular to Flow ^{Note 2}			
1 m/s	ISO 527-1/2	MPa	≥ 155
0.1 m/s	ISO 527-1/2	MPa	≥ 160
0.01 m/s	ISO 527-1/2	MPa	≥ 150
0.001 m/s	ISO 527-1/2	MPa	≥ 140

Note 1: Specimens tested for Stress at Break to ISO 527 and Notched Charpy Impact Strength to ISO 179 at +23 ± 2 °C after heat aging 1000 h ± 5 h at +140 °C ± 5 °C according to ISO 188 Method A (air oven method) shall have a minimum of 75% retention relative to unaged specimens tested concurrently.

Note 2: Not statistically derived.